HIGH PEAK DISTRICT COUNCIL

SCATTER Emissions Baselining

September 2021

Anthesis

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01 Introduction

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High Peak District Council

1. INTRODUCTION
REPORT OVERVIEW & SCOPE

This report was commissioned by High Peak Council, who declared a climate emergency in 2019 and are in the process of developing a climate action plan to tackle emissions from the council's operations and those of the borough.

The report is structured as follows:

- **Chapter 1** provides the context for climate change action and sets out past emissions trends and performance
- **Chapter 2** provides an emissions inventory for the district, as defined by the SCATTER Inventory tool
- **Chapter 3** provides a carbon budget for energy system emissions, based on research carried out by the Tyndall Centre for Climate Change Research at the University of Manchester.

The aim of this report is to support High Peak Borough Council in achieving its borough-wide target of becoming carbon neutral by 2030, by meeting the following objectives:

1. Provide a robust baseline assessment of area-wide emissions that is aligned to international reporting standards
2. Use this information to inform the urgency and scale of action required to remain in line with the Paris Agreement
3. Identify high-level priorities for the council to consider moving forwards as next steps

The scope of this report includes emissions from the consumption of solid, liquid and gaseous fuels within the area boundary of High Peak. Figures quoted in the body of the report represent *direct* and *indirect* emissions arising from energy consumption within the area boundary.

Background & context

Commitments to reducing greenhouse gas (GHG) emissions have been made at various levels of government in recent years.

In 2015, the Paris Agreement set the international target to limit global temperature increase to *"well-below 2°C above pre-industrial levels"*. A follow up report from the Intergovernmental Panel on Climate Change (IPCC) found that this requires a reduction in GHG emissions of around 45% by 2030 against a 2010 baseline.

Within the UK, legislation has been in place since 2008 which sets reductions targets for national emissions. The Climate Change Act was subsequently strengthened in 2019 to reflect a more ambitious target of achieving carbon neutrality no later than 2050. In late 2020, the UK Committee on Climate Change (CCC) Sixth Carbon Budget set out further targets to achieve at least a 78% reduction in emissions no later than 2035 (against a 1990 baseline).

1. INTRODUCTION
EMISSIONS HISTORY

Local commitment to action on reducing climate change was reflected in council declarations in 2019.

High Peak Borough Council committed to a carbon neutral target of 2030 both for the organisational emissions of the council itself as well as the borough as a whole.

Emissions history

Each year, the government publish data on local authority area emissions, documenting the GHG impact of in-boundary fuel consumption. Over time, these can be assessed for trends in performance. By 2019, national emissions had fallen by around 45% against 1990 levels, largely thanks to the removal of carbon-intensive fuels such as coal from the energy mix used to supply electricity to households.

Figure 1.1 opposite shows the historic performance for High Peak and Staffordshire Moorlands from 2005-19, based on statistics published by the Government Department for Business, Energy & Industrial Strategy (BEIS). Since 2010, emissions in High Peak have remained roughly stable around 3,000 $ktCO_2$, though analysis of subset data indicates a reduction of around 34% over the same time period.

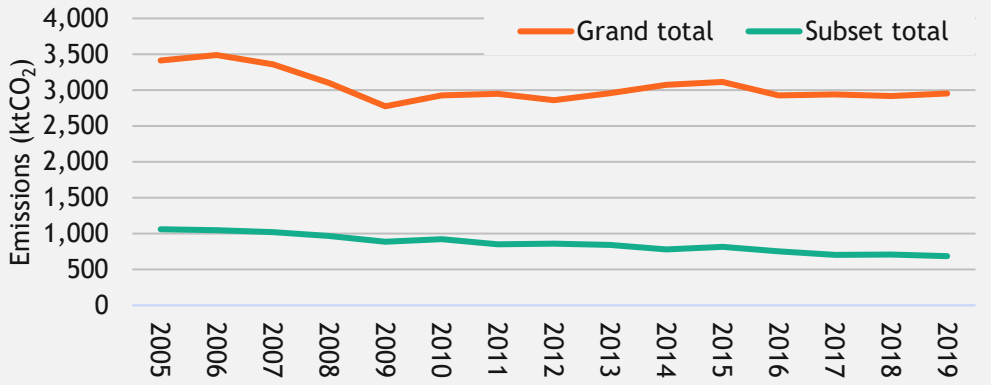


Figure 1.1: Historic emissions from BEIS for High Peak. Subset total data refers to the grand total figure minus large industrial sites, motorways, land use and railway emissions.

1. INTRODUCTION
UNDERSTANDING BEIS DATASETS

Historic BEIS datasets are useful in observing trends and changes to emissions over time, since they provide the means for comparing the emissions impact of various activities across different years.

It can however be difficult to judge whether some changes in emissions from one year to another are due to changes in activity or if they represent differences in the scope of reporting for different disclosure schemes. Since reporting scopes for schemes such as the EU Emissions Trading Scheme (EU ETS) are updated periodically, and the associated emissions relate to one specific site in many cases, this can pose challenges when considering emissions from large industrial sites. This is especially relevant to High Peak which records significant emissions from large industrial installations.

Introducing SCATTER

SCATTER is an emissions baselining and modelling tool that is free to use for local authorities in the UK. The tool provides estimates for emissions, broken down by scope, considering a broader range of GHGs than BEIS figures and adopting slightly different methodologies for the calculation of emissions in some sectors.

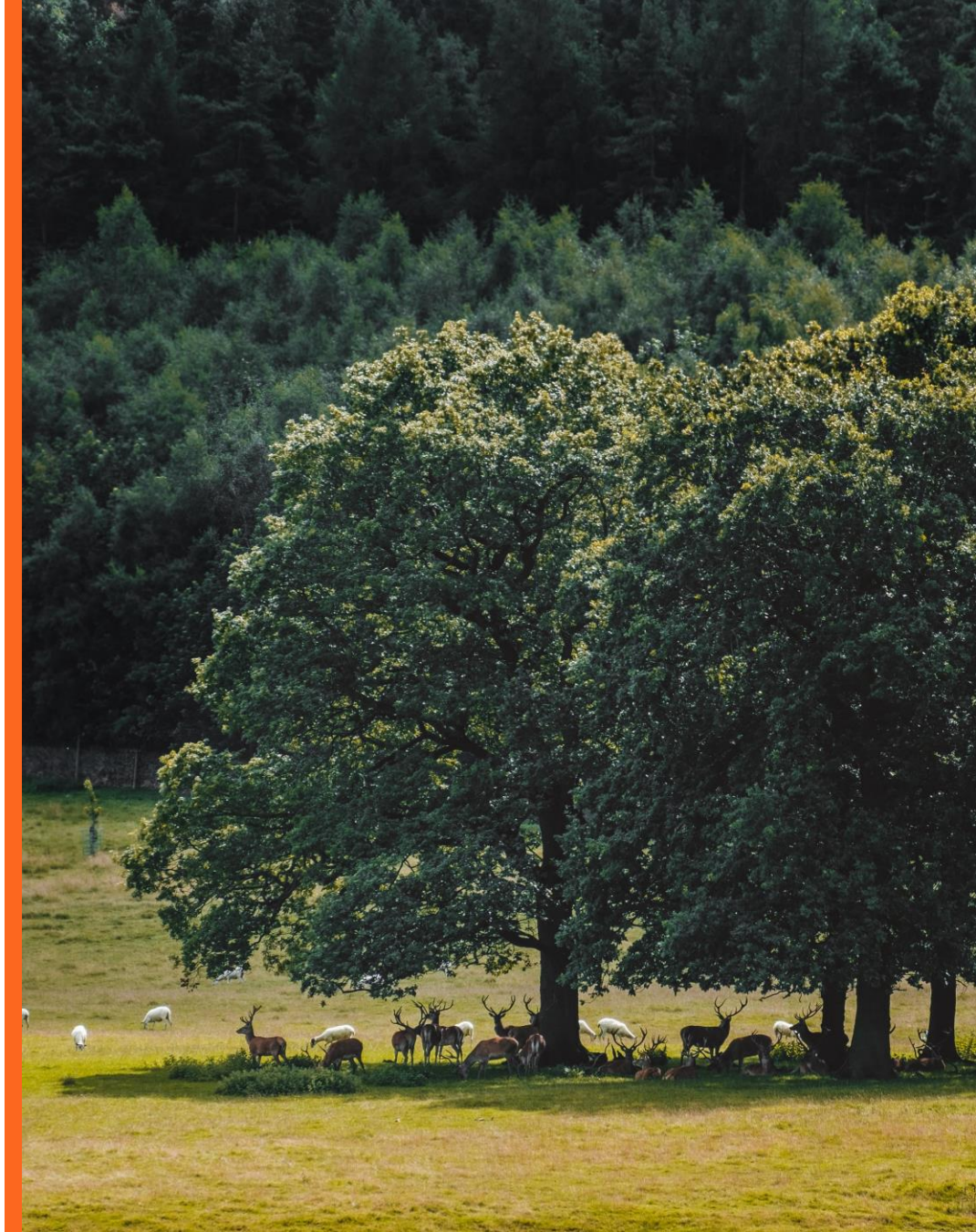
The tool was developed in partnership with BEIS, local authorities and the Tyndall Centre for Climate Change Research. A summary of the differences between BEIS and SCATTER emissions data can be found in Appendix 2.

One of the more significant benefits of using SCATTER data is that the tool is aligned to international reporting frameworks. Figures within SCATTER are developed according to guidance in the GHG Protocol for Cities.

Activities and figures required for specific reporting frameworks have been highlighted in Appendix 1, and it is worth noting that the totals quoted within Chapter 2 represent a broader “basket” of emissions than is required for the most basic reporting standards.

Adoption of the GHG Protocol guidance means that the methodologies adopted within SCATTER are different to those used by BEIS in some cases, which can lead to differences and deviations in figures quoted for the same emissions category.

02 SCATTER Emissions Inventory



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High Peak District Council

2. SCATTER INVENTORIES
HIGH PEAK

In 2018, High Peak's in-boundary emissions totalled 1,181 $ktCO_2e$. The majority resulted from buildings (76%) and transport (12%).

This emissions inventory has been calculated from the SCATTER Inventory tool. The figures shown opposite represents emissions from a specified set of activities within the borough boundary.[1]

The remainder of this section provides a breakdown of each of the sectors defined opposite, with a more detailed description of each emissions source.

Differences with BEIS data

The SCATTER Inventory tool is aligned to international reporting frameworks but there are important differences between the activities included in SCATTER compared to those reported under BEIS LA CO_2 statistics.

The differences between SCATTER and BEIS datasets are discussed in more detail in Appendix 2. SCATTER considers emissions from multiple greenhouse gases, including carbon dioxide, nitrous oxide and methane with the data opposite relating to the 2018 reporting year. The emissions inventory only includes emissions generated within High Peak (Scopes 1 & 2).

A full data table can be found in Appendix 1.

1 – For disclosure through international reporting frameworks, only some of these activities are required to be reported against. See Appendix 1 for more details on these.

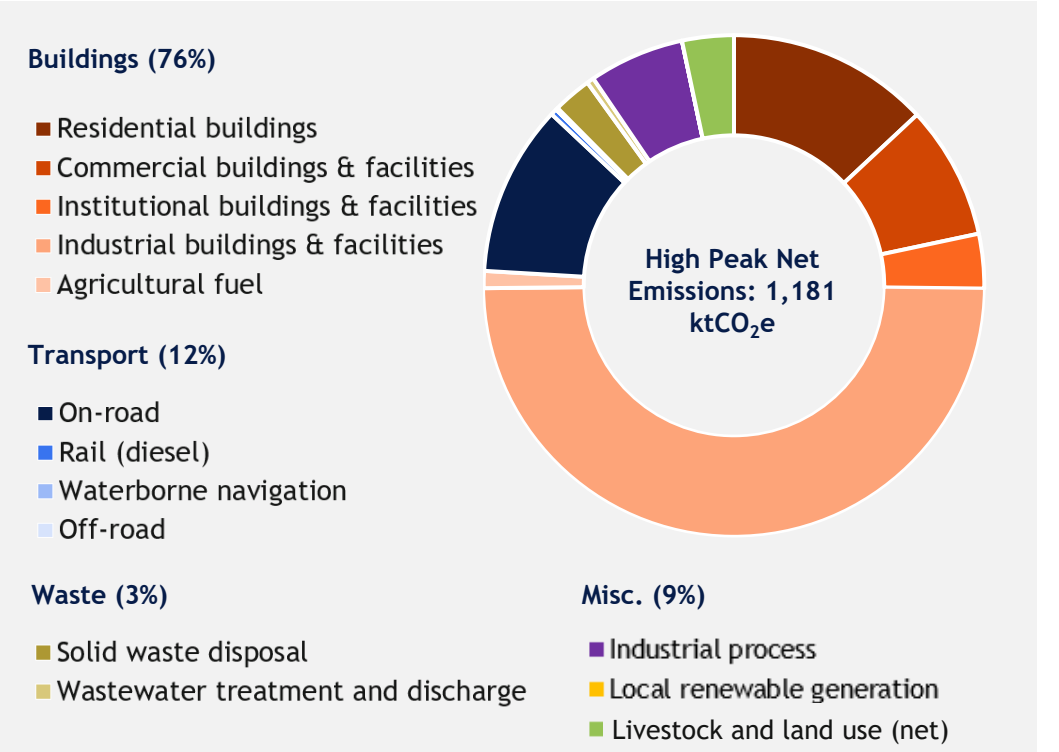


Figure 2.1: SCATTER inventory for High Peak, showing all direct and indirect emissions recorded under SCATTER.

2. SCATTER INVENTORIES
HIGH PEAK

Residential buildings

Emissions from residential buildings totalled **154 $ktCO_2e$** within High Peak in 2018. This figure estimates emissions arising from the consumption of energy in residential buildings of all types and tenures, including social housing, rented accommodation and privately-owned properties. In 2018, there were an estimated 42,700 households[1] in High Peak.

The most significant source of emissions from households comes from the use of energy for heating and hot water. Most of this is achieved through natural gas consumption, with gas demand for heating making up 67% of residential building emissions. The second most significant source of emissions is the use of grid-supplied electricity to the borough for lighting, appliances and cooking, which makes up around 22% of residential emissions. The remainder is made up of small contributions from other fuel types.

Emissions from residential buildings can be mitigated by improving the energy efficiency of households through retrofitting measures, which reduce the overall demand for energy to heat the borough's homes. Switching to low-carbon heating systems, such as heat pumps, is another means of reducing domestic emissions.

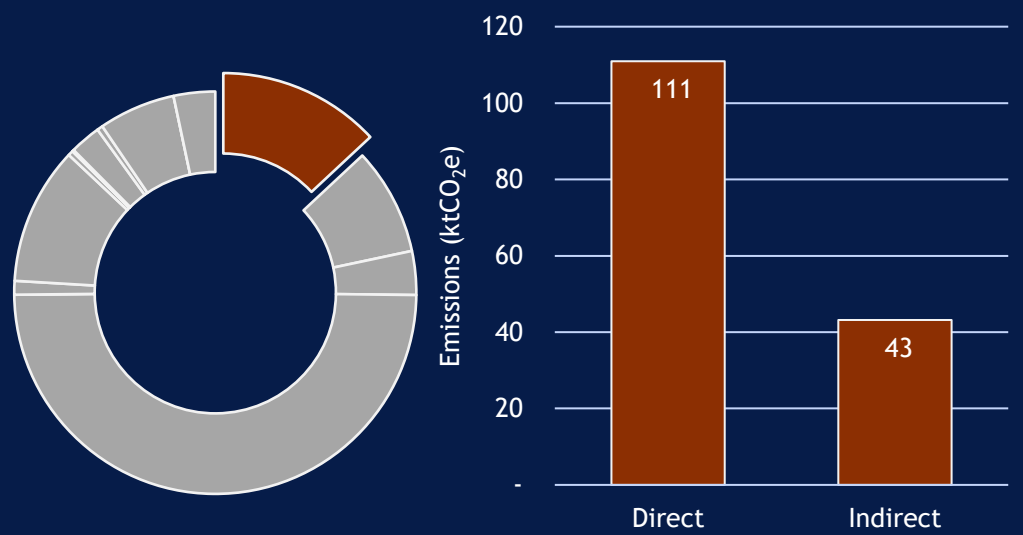


Figure 2.2: Residential emissions as a proportion of the borough-wide profile (left). A breakdown of the split between direct and indirect residential emissions (right).

1 - ONS, Estimate number of households in the local and unitary authorities of England and Wales (2018)

2. SCATTER INVENTORIES
HIGH PEAK

Non-residential buildings

By far the most significant contributor to High Peak's emissions is the non-residential buildings sector, totalling **730 $ktCO_2e$** across commercial, institutional and industrial buildings in 2018:

- **Commercial buildings & facilities** include buildings from which businesses operate such as shops and retail parks, offices, restaurants
- **Institutional buildings & facilities** include public sector buildings such as schools, health centres, hospitals, leisure centres, council buildings and so on
- **Industrial buildings & facilities** include sites such as factories, warehouses and workshops associated with manufacture and engineering
- **Fugitive emissions** are also classified under this category – these emissions relate to irregular leaks of greenhouse gases from equipment and containers

The most significant source of emissions from non-residential buildings is the contribution from coal consumption at the borough's industrial facilities. This is likely the result of activities at Hope Cement Works, which uses coal kilns and is the largest cement plant in the United Kingdom (in terms of tonnages of cement). As with residential buildings, the next most significant contributions to these totals is natural gas consumption for heating and hot water and electricity for appliances, lighting and cooking.

Emissions from non-residential buildings can be mitigated in much the same way as residential buildings; improving energy efficiency through retrofit, as well as switching to low-carbon heating systems.

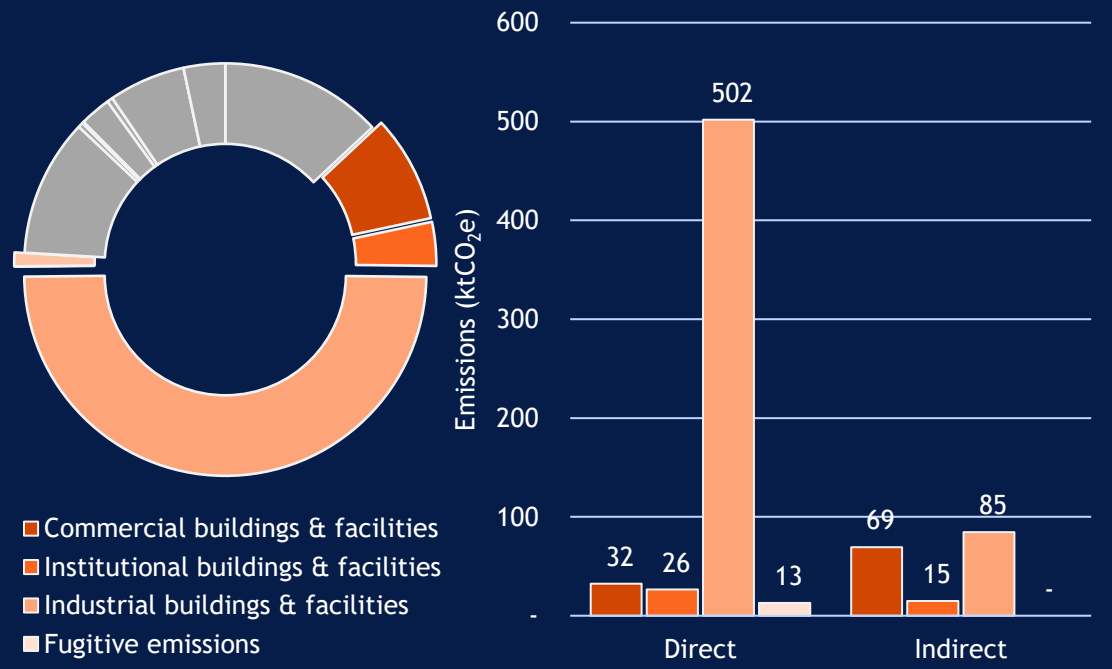


Figure 2.3: Non-residential building emissions as a proportion of the borough-wide profile (left). A breakdown of the split between direct and indirect non-residential building emissions (right).

2. SCATTER INVENTORIES
HIGH PEAK

Transport

Emissions from transport totaled 137 $ktCO_2e$ in 2018. SCATTER measures emissions from the following activities:

- **On-road transport** emissions are measured from all forms of on-road passenger and freight vehicles, including cars, vans, motorcycles, buses and taxis
- **Rail transport** emissions are measured from diesel-fuelled rail transport only – emissions from any electrified rail services are included in the commercial and industrial sectors
- **Waterborne navigation** describes emissions from transport along the borough's waterways according to the length of available throughfares
- **Off-road transport** describes emissions from land vehicles that are not classified as "on-road"

On-road transport dominates the emissions in this sector; DfT data indicates that over 4.1 billion vehicle miles were driven across Derbyshire's roads in 2018.

The proportion of electric vehicles in the borough has grown significantly in recent years, but still constitutes less than 1% of the overall number of registered vehicles.

Mitigating transport emissions can be achieved by a combination of modal shift to more active modes of travel such as cycling and walking, as well as the transition to electric vehicles from petrol and diesel.

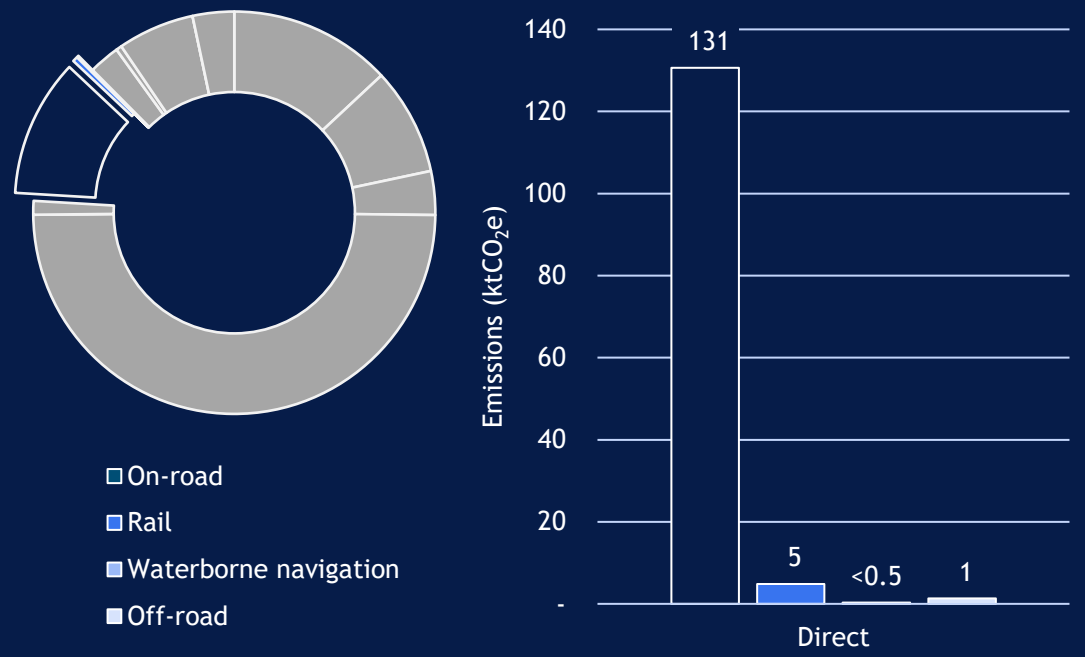


Figure 2.4: Transport emissions as a proportion of the borough-wide profile (left). A breakdown of the split between different subsectors of transport emissions (right).

2. SCATTER INVENTORIES
HIGH PEAK

Waste

Emissions from waste totaled **35 $ktCO_2e$** in 2018. SCATTER measures emissions from the following activities:

- **Solid waste disposal** emissions are associated with the treatment of commercial, industrial and municipal waste through various means, including incineration, open- and closed-loop recycling and composting
- **Wastewater** emissions are associated with the biological processes used to treat and manage liquid waste.

According to DEFRA statistics for FY18/19, High Peak saw a recycling rate of just under 49%, with an average of 372kg of collected waste per resident.

Miscellaneous emissions

SCATTER also measures emissions across smaller sectors of activity, categorized for the purposes of this report under miscellaneous. This category and the associated emissions stem from:

- Industrial processes (**73 $ktCO_2e$**) which describes emissions from all non-energy related processes in industrial facilities, such as manufacturing and production of chemicals, metals and minerals
- Net livestock and land use (**39 $ktCO_2e$**) which accounts for emissions from rearing livestock and manure management netted off against emissions sequestered by the natural environment
- Local renewable generation (**<0.01 $ktCO_2e$**) which accounts for emissions as a result of local landfill gas sites

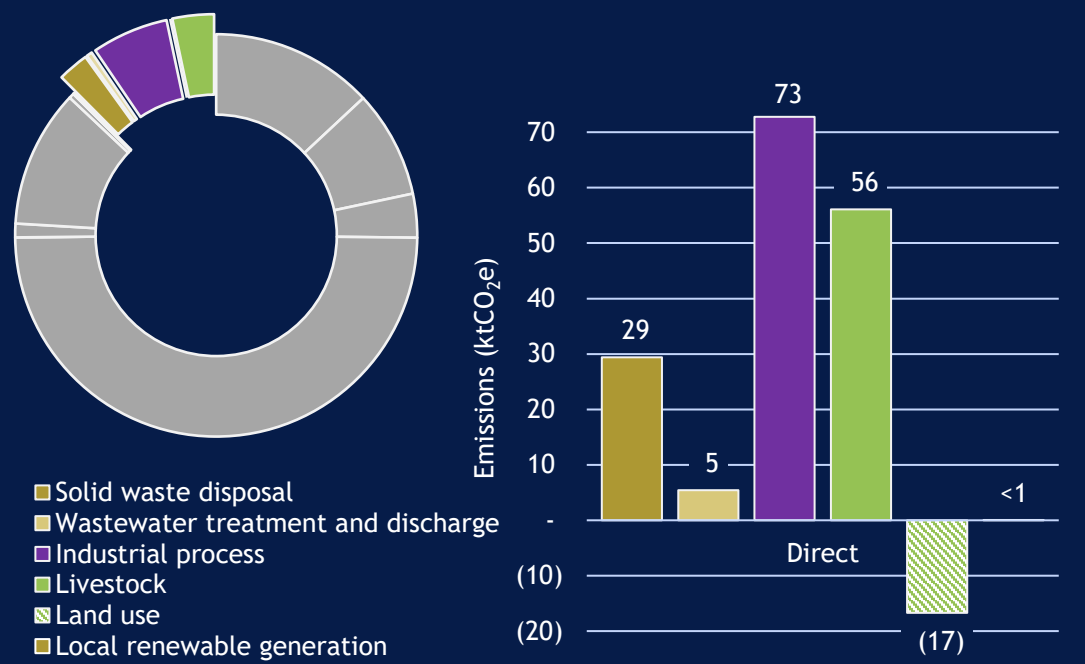
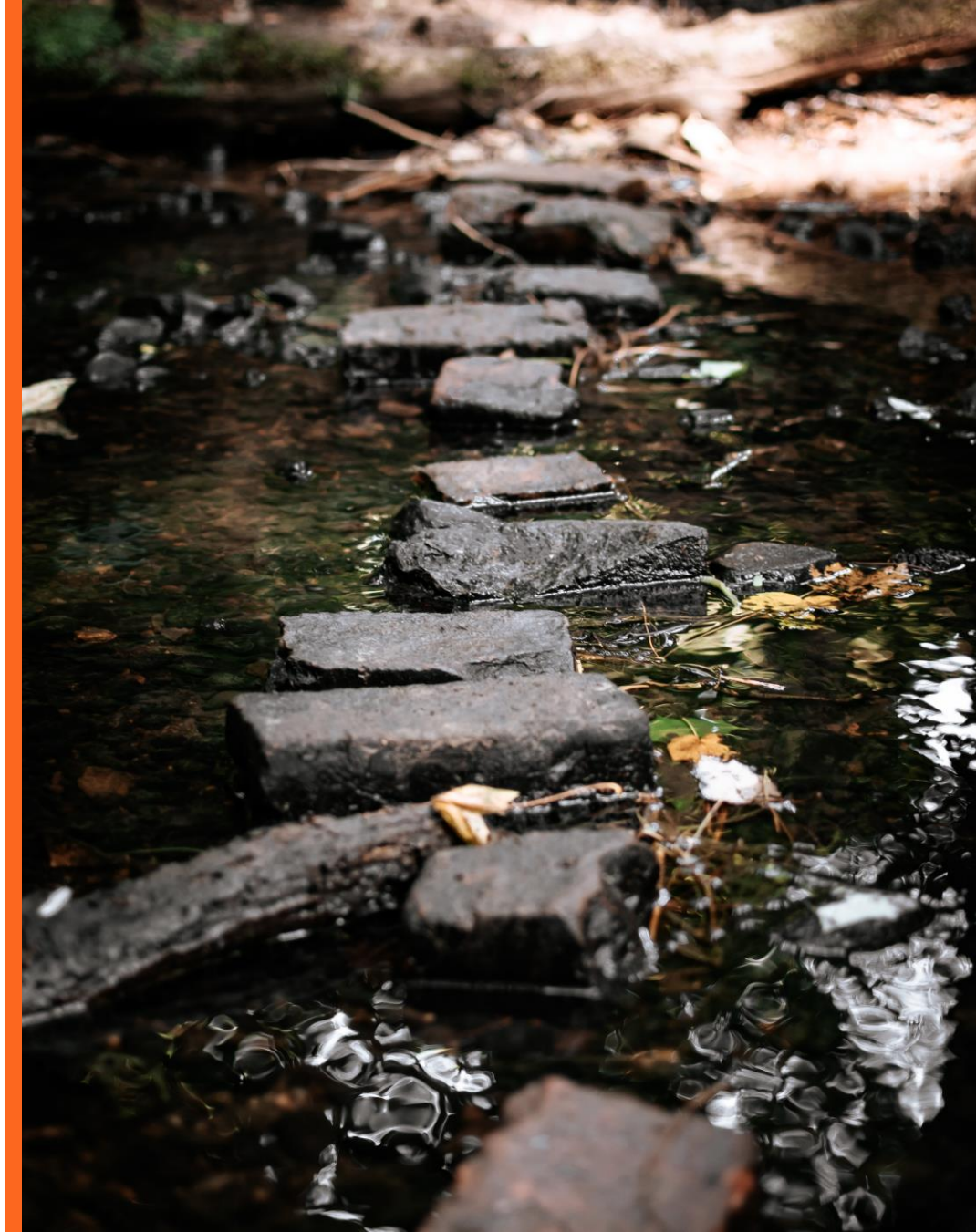


Figure 2.5: Waste & miscellaneous emissions as a proportion of the borough-wide profile (left). A breakdown of the split between different subsectors of emissions (right). Land use emissions (dashed green) are negative in High Peak – figures quoted in the initial profile take the net figure of livestock and land use emissions.

03 Carbon Budget Analysis



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High Peak Borough Council

3. CARBON BUDGET ANALYSIS
INTRODUCTION

This chapter discusses future emissions in terms of a *carbon budget* approach, based on research by the Tyndall Centre at the University of Manchester.

What is a carbon budget?

A carbon budget is a fixed limit of cumulative emissions that are allowed within a given time, in order that increases in average global surface temperatures remain within a certain threshold.

The budget approach

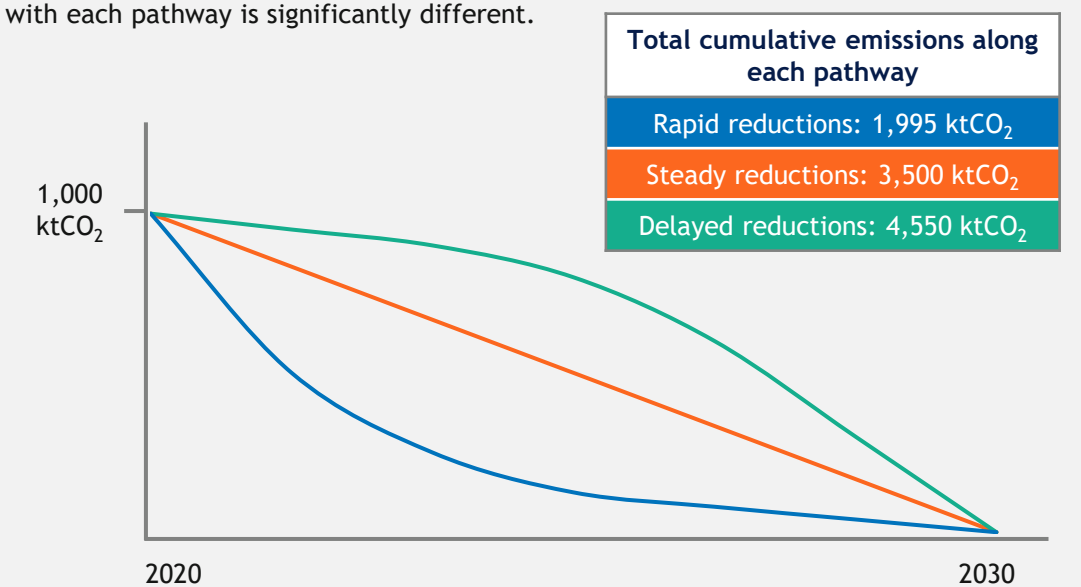
When considering future routes to carbon neutrality, it is important to introduce the concept of a carbon budget.

This approach highlights the importance of *cumulative* carbon emissions, since emissions now mean impacts later. Once emitted, carbon dioxide remains in the atmosphere for many decades, contributing to increasing the average global temperature. This means that the carbon budget does not reset; it represents a fixed upper limit to emissions.

This approach is analogous to a monthly payday cheque, in the sense that the budget can be spent on the first day after getting paid, or be stretched out over the course of the month. Once it is "spent" (or in the case of a carbon budget, emitted) there is no budget left.

This means that the *pathway* taken to carbon neutrality is as important as the selected target date, since different pathways will reach the target having emitted different amounts of cumulative emissions along the way. This highlights the importance of the *annual reduction rate* when considering carbon budgets.

Figure 3.1: Illustrative example of a carbon budget approach for a starting point of 1,000ktCO$_2$. Although all three of these hypothetical pathways reach net zero carbon by the same target date, the cumulative emissions (i.e. the *carbon budget*) associated with each pathway is significantly different.



3. CARBON BUDGET ANALYSIS
TYNDALL CENTRE RESEARCH

The Tyndall Centre for Climate Change Research, based at the University of Manchester, have carried out an assessment for each UK local authority in terms of their "fair" contribution towards remaining in line with the Paris Agreement.

The Paris Agreement's "*well-below 2°C*" scenario sets an upper limit on allowed global emissions. Tyndall Centre academics have scaled this emissions ceiling down, allowing local authorities to understand the scale and extent to which they must reduce their emissions between the present and their target year for carbon neutrality.

A more detailed description of the Tyndall Centre's approach can be found in Appendix 3.

There are however a number of noteworthy caveats to make when considering carbon budget analysis:

- Emissions from **agriculture and land use** are not directly taken into account when calculating local authority budgets, instead being considered at the national level
- The budget applies to **energy system** emissions only – cement manufacturing is not included within this analysis
- Non-CO_2 emissions are also excluded from the analysis

In light of the fact that SCATTER baselines include a broader basket of local authority emissions than is assessed by the carbon budget analysis, the key takeaway piece of information is the *annual reduction rate* of emissions.

Key statistics at a glance – High Peak

An annual reduction rate of **15.8%** is recommended to keep High Peak aligned with Paris Agreement targets

According to BEIS statistics, between 2005 and 2019 the average annual emissions reduction rate in High Peak was just over **1%**

If High Peak continues along a business-as-usual scenario, the carbon budget (2020 – 2100) will be **exceeded by 2026**

3. CARBON BUDGET ANALYSIS
CARBON BUDGET

High Peak Carbon Budget

The Tyndall Centre recommends that cumulative emissions from the energy system within High Peak do not exceed 10,800ktCO$_2$ over the period 2020-2100. Figure 3.2 illustrates carbon budget milestones based on the annual reduction rate for High Peak.

For a full description of the differences between the SCATTER, BEIS and Tyndall Centre emissions data please see Appendix 2.

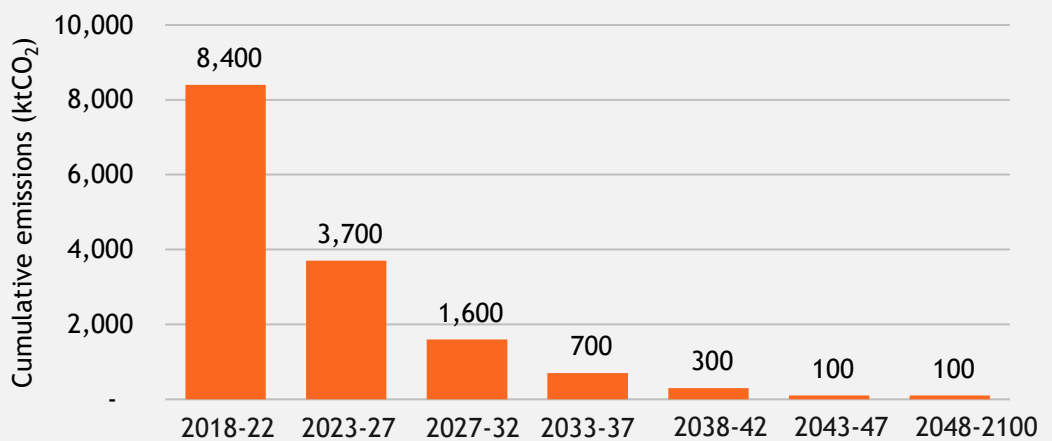


Figure 3.2: Bar chart describing the Tyndall carbon budget, broken down into the periods defined in government reporting frameworks. The decline in emissions is based on the annual reduction rate of 15.8%.

Recommendations and Next Steps

Following the exploration of High Peak's emissions baseline and carbon budgets in this report, it is recommended that the council develops a roadmap to meet the 2030 net zero target.

To do this, High Peak Borough Council should next look to:

1. Understand the type of measures needed to reduce emissions in the borough aligned to the 2030 net zero target
2. Estimate the scale and speed of implementing measures needed and engage internal stakeholders to understand what this means for the borough
3. Work with key external stakeholders such as residents, businesses and other organisations to develop an action plan
4. Continue to measure and report on the borough's emissions against KPIs to track progress

04 Appendices

APPENDIX 1
EMISSIONS DATA TABLES – HIGH PEAK

Sector	Scope 1 & 2 Emissions, $ktCO_2$
Industry and Commercial Electricity	140.3
Industry and Commercial Gas	122.0
Large Industrial Installations	2,222.6
Industrial and Commercial Other Fuels	52.4
Agriculture	5.9
Domestic Electricity	35.9
Domestic Gas	108.0
Domestic 'Other Fuels'	7.8
Road Transport (A roads)	89.7
Road Transport (Motorways)	-
Road Transport (Minor roads)	58.2
Diesel Railways	5.4
Transport Other	1.5
LULUCF Net Emissions	-16.7
Grand Total	**2,832.9**

Notes:

- BEIS data (left) and SCATTER data (right) are compiled using different methodologies.
- Within the SCATTER model, national figures for emissions within certain sectors are scaled down to a local authority level based upon a series of assumptions and factors taken from fuel consumption data, as opposed to being directly quoted emissions data. This is particularly of note in the large industrial installations subcategory.
- BASIC and BASIC+ frameworks relate to international reporting standards as set out in the GHG Protocol for Cities.
- BASIC+ framework also requires disclosure of Scope 3 ("Other") emissions for the built environment and transport sectors. These are available within the full SCATTER inventory available at www.scattercities.com

IE	= Included Elsewhere
NE	= Not Estimated
NO	= Not Occurring
	Included under BASIC framework
	Included under BASIC+ framework

Sub Sector	Direct, $ktCO_2e$	Indirect, $ktCO_2e$
Residential buildings	110.96	43.22
Commercial buildings & facilities	32.48	69.29
Institutional buildings & facilities	26.49	15.04
Industrial buildings & facilities	501.91	84.58
Agricultural fuels	-	-
Fugitive emissions	13.03	-
On-road	130.66	IE
Rail	4.83	IE
Waterborne navigation	0.31	IE
Aviation	NO	IE
Off-road	1.31	IE
Solid waste disposal	29.42	-
Biological treatment	NO	-
Incineration and open burning	NO	-
Wastewater	5.43	-
Industrial process	72.80	-
Product use	0.00	-
Livestock	56.09	-
Land use	- 16.70	-
Other AFOLU	NE	-
Electricity-only generation	NO	-
CHP generation	NO	-
Heat/cold generation	NO	-
Local renewable generation	0.00	NO
Sub-total	969.03	212.14
Grand total	**1,181.16**	

APPENDIX 2
DIFFERENCES BETWEEN BEIS & SCATTER INVENTORIES

Why does the BEIS summary differ from the SCATTER summary?

- The BEIS summary **represents CO_2 only**; SCATTER also includes emissions factors for other greenhouse gases such as Nitrous Oxide (N_20) and Methane (CH_4). These are reported as a CO_2 'equivalents (e)'.
- The BEIS summary **does not provide scope split**; SCATTER reports emissions by scope 1, 2, and 3 (i.e. direct, indirect or other categories) and includes more scopes than BEIS summary.
- **The BEIS summary categories are not directly consistent or mapped to the BEIS LA fuel data** which is available as a separate data set. SCATTER uses published fuel data and applies current-year emissions factors, whereas the BEIS data calculations scale down national emissions in each transport area. Specifically for road transport, BEIS data splits total emissions across road type; SCATTER uses total fuel consumption for on-road transport per LA.
- **Different treatment of 'rural' emissions** i.e. Agriculture, Forestry and Other Land Use (AFOLU) and Land Use, Land Use Change & Forestry (LULUCF) categories are derived from different underlying data sets.

	SCATTER	BEIS
Summary	1. Latest GHG Inventory by subsector 2. Pathways for emissions to 2050	Latest CO_2 Inventory by subsector
Purpose	1. To provide each LA with an accurate current baseline in a standardised format according to international guidelines. 2. To model scenarios for emissions reduction to 2050 based on the baseline emissions and selected interventions, to support LA climate action planning.	To provide each LA with an accurate current baseline of CO_2 emissions in a standardised format across the UK.
Scopes covered	Scope 1, Scope 2 and some Scope 3.	Scope 1 and 2 only.
Sources covered	Stationary Energy Transport Waste Industrial Processes and Product Use Agriculture, Forestry and Land use Generation of grid-supplied energy	Industrial and Commercial Domestic Transport
Sources excluded	Scope 3 emissions from Biological treatment, Incineration & open burning of waste and Wastewater. Scope 3 emissions from Electricity-only, Heat/cold and Local renewable generation. Scope 3 fugitive emissions.	Energy generation, Waste, Off-road transport, Rail transport, Waterborne navigation, Aviation.

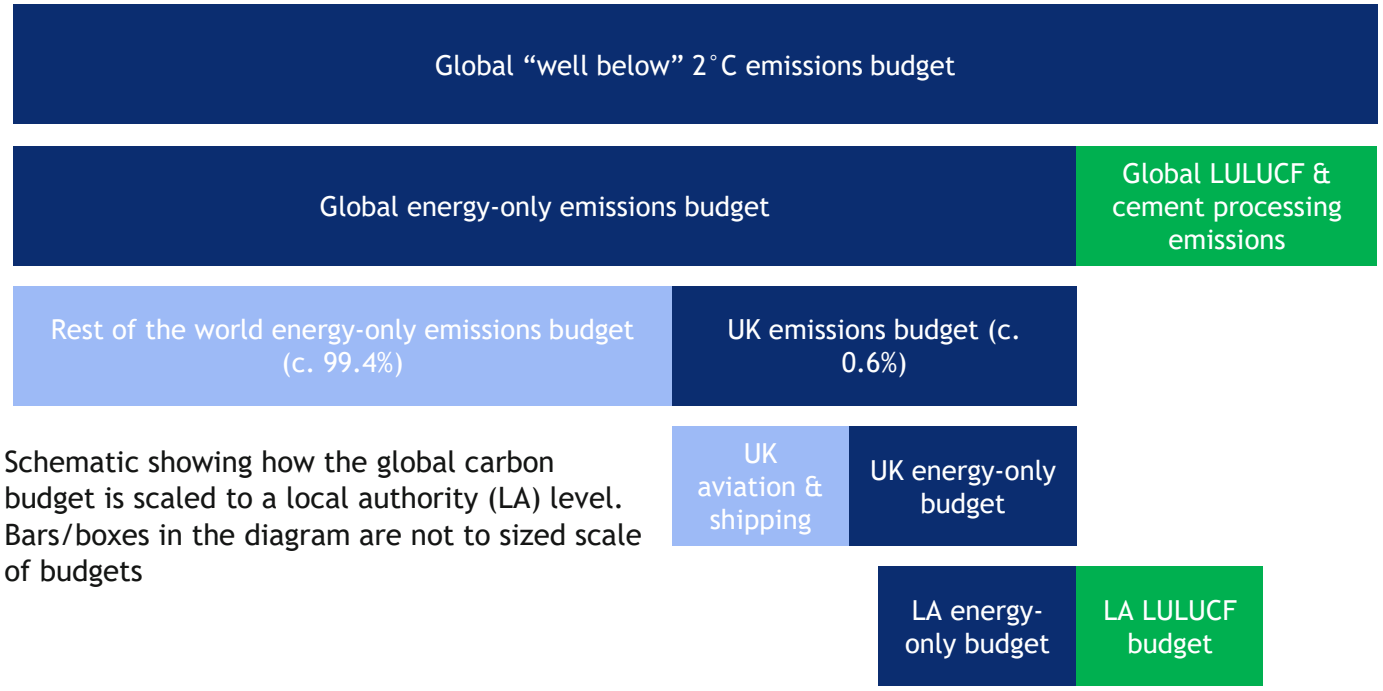
APPENDIX 3
TYNDALL CARBON BUDGET METHODOLOGY

The Tyndall Centre for Climate Change Research, based at the University of Manchester, have translated the Paris Agreement targets of limiting temperature change below 1.5˚C into a fixed emissions 'budget' for each local authority.

The carbon budget defines a finite emissions limit that should not be exceeded in order that each local authority plays its full part in adhering to the Paris Agreement.

The global budget is taken from the IPCC Special Report on 1.5˚C and represents the latest IPCC estimate of the quantity of CO_2 that can be emitted whilst remaining consistent with keeping global temperatures below 2˚C.

Link to full carbon budget report for High Peak



Schematic showing how the global carbon budget is scaled to a local authority (LA) level. Bars/boxes in the diagram are not to sized scale of budgets

APPENDIX 3
TYNDALL CARBON BUDGET METHODOLOGY

Methodology Notes

- Budget derived from IPCC AR5 synthesis report and represents a 66-100% probability of global warming not exceeding 2°C ("well below"). Due to the inertia in our energy systems and the amount of carbon we have already emitted, the Paris 1.5°C commitment is now only likely to be viable if negative emissions technologies (NETs) prove to be successful at a global scale. If the emissions reduction rates for High Peak and Staffordshire Moorlands are achieved and NETs are deployed at the scales assumed in the global models, then the targets adopted may be considered as a 1.5°C compatible. This also expressly assumes that other carbon cycle feedbacks, such as methane released due to melting permafrost etc., do not occur, and that an overshoot of 1.5°C does not result in increased feedbacks that further accelerate warming at lower budgets than the IPCC budgets currently estimate.
- LULUCF stands for Land Use, Land Use Change & Forestry
- UK Aviation & Shipping is accounted for at the national level. If emissions due to aviation and shipping increases, then a smaller proportion of the UK-wide budget is available for the energy-only budget and vice versa.

Negative Emissions Technologies (NETs)

NETs remain a highly speculative and uncertain development and are leaned upon heavily in IPCC models.
If research, development and demonstration of NETs shows that they may work at scale, and then they are rolled out globally at unprecedented rates, 1.5°C may theoretically be achievable. However, this is only made possible if rapid, deep 2°C mitigation begins now, and additional feedbacks do not occur.

Exclusions from this budget

A key omission from this budget are emissions from aviation and shipping – the budget considers only the *energy system*. This "energy-only" budget also excludes emissions from land use, land change and forestry, as well as cement manufacturing.
The nature of aviation & shipping emissions means that responsibility is not attributed to individual authorities, but is instead accounted for at the UK level, as a "national overhead". The Tyndall Centre analysis assumes that UK emissions from aviation remain constant up until 2030, followed by a steady reduction towards net zero carbon by 2075.

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